

## CLAIMS:-

1. A communications multi-service network comprising a plurality of nodes  
5 interconnected via quality of service capable tunnels and incorporating a frame-  
mode MPLS architecture whereby IP services are run directly over a frame-based  
core network and legacy services are run over ATM adaptations and emulated  
ATM services.
- 10 2. A communications network comprising a plurality of core nodes establishing a  
transport network, service nodes each coupled to a said core node to provide  
access to the transport network, and a network management system arranged to  
define and manage one or more virtual public/private networks within said  
15 communications network, wherein groups of said core nodes are configured as  
abstract nodes within which abstract nodes any available path may be selected to  
achieve a requested connection, and wherein end to end label switched paths  
are established via the management system by specifying a series of abstract  
nodes.
- 20 3. A communications network as claimed in claim 2, wherein each said path is  
specified by identifying first and second real nodes and one or more abstract  
nodes therebetween.
4. A communications network as claimed in claim 3, wherein a said virtual  
25 public/private network (VPN) is defined with multiple stages of first level  
constraint-based routed label switched paths.
5. A communications network as claimed in claim 4, wherein each said abstract  
30 node is defined by an IP address prefix, and all core nodes which include that  
prefix in their IP address are part of that abstract node.
6. A communications network as claimed in claim 5, and incorporating a super-  
ordinate management function arranged to control creation, modification and  
35 deletion of virtual switches.

7. A communications network as claimed in claim 6, wherein said super-ordinate manager is adapted for defining virtual private/public networks (VPN) and for placing traffic trunks to realise those VPNs
- 5 8. A communications network as claimed in claim 7, and incorporating a subordinate management function arranged to provide virtual switch management.
9. A communications network as claimed in claim 8, wherein a (sub) network manager is responsible for constructing an abstract node information model
- 10 representation of the network which it passes to a super-ordinate manager.
10. A method of operating a communications multi-service network comprising a plurality of nodes interconnected via quality of service capable tunnels, wherein ATM is used for low or medium capacity access, and wherein frame mode is
- 15 ~~used frame mode is~~ used for access to corporate users and for core transport.
11. A method of operating a communications multi-service network comprising a plurality of core nodes establishing a transport network, and service nodes each coupled to a said core node whereby access to the transport is provided, and
- 20 having a network management system arranged to define and manage one or more virtual public/private networks within said communications network, the method comprising configuring groups of said core nodes as abstract nodes within which any available path may selected to achieve a requested connection, and wherein end to end label switched paths are established via the
- 25 management system by specifying a series of abstract nodes.
12. A method as claimed in claim 11, wherein each said path is specified by identifying first and second real nodes and one or more abstract nodes therebetween.
- 30 13. A method as claimed in claim 12, wherein a said virtual public/private network (VPN) is defined with multiple stages of first level constraint-based routed label switched paths.
- 35 14. A method as claimed in claim 13, wherein each said abstract node is defined by an IP address prefix, and all core nodes which include that prefix in their IP address are part of that abstract node.

15. A method as claimed in claim 14, and including creation, modification and deletion of virtual switches via a super-ordinate management function.
- 5 16. A method as claimed in claim 15, wherein said super-ordinate manager is adapted for defining virtual private/public networks (VPN) and for placing traffic trunks to realise those VPNs.
- 10 17. A method as claimed in claim 16, wherein ATM is used for low or medium capacity access, and wherein frame-mode is used for access to corporate sites and for core transport.

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